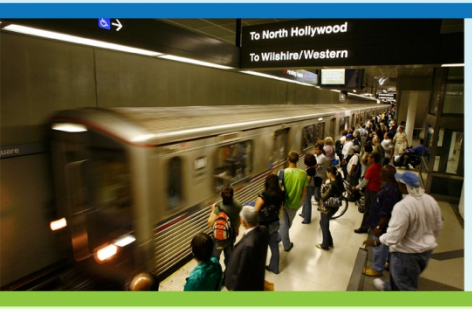
Performance Measurement System (PeMS) Database Development

SCAG Modeling Task Force Meeting

March 27, 2013





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Background

Purpose

- PeMS (Performance Measurement System) provides an accounting framework for tracking freeway performance (flow and speed, etc.)
- Develop a traffic flow database from PeMS data for SCAG's model validation and other analysis
- Potentially, data can be used for:
  - Assignment validation (STA, TOD)
  - External trips, weekend traffic
  - Hourly, weekly, seasonal, annual variation by area

Data Collection

- Daily data by 5-minute interval for each Caltrans district can be downloaded online
- We downloaded data between Jan to Dec 2012 (total 366 days) and then excluded holidays seasons and summer break
- Data includes flow and speed for each Vehicle Detector Stations (VDS) – 8,103 VDSs
- We aggregated data to 15-minute interval
  - A VDS is removed if no traffic data is recorded

PeMS VDS Within SCAG Region

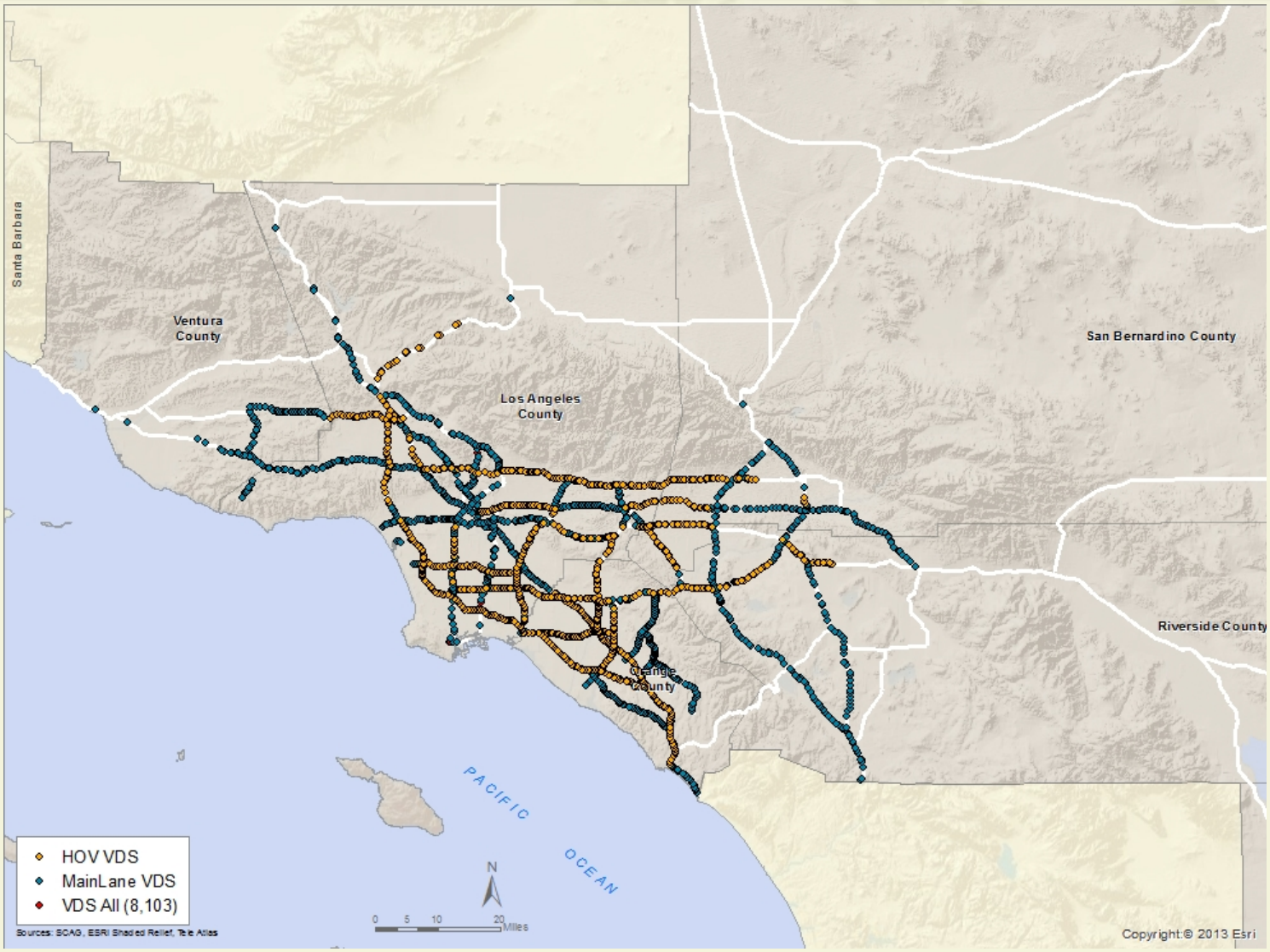
County	Mainline	HOV	Others*	All VDSs
Los Angeles	1,693	756	1,907	4,356
Orange	952	531	835	2,318
Riverside	370	75	106	551
San Bernardino	360	136	149	645
Ventura	114	1	118	233
Sum	3,489	1,499	3,115	8,103

- *No VDS in Imperial county*
- *Other VDS include freeway-freeway connectors, and on/off ramps*

Link VDS to SCAG Network

- Use x, y coordinate to map all PeMS VDS in SCAG highway network
- Keep Mainlane (ML) and HOV(HV) VDS only (excluded freeway connectors, on/off ramps)
- Spatial Join ML and HV VDS to the nearest highway main lane and HOV links
- Remove duplicated and incorrect joins (VDS data quality control)

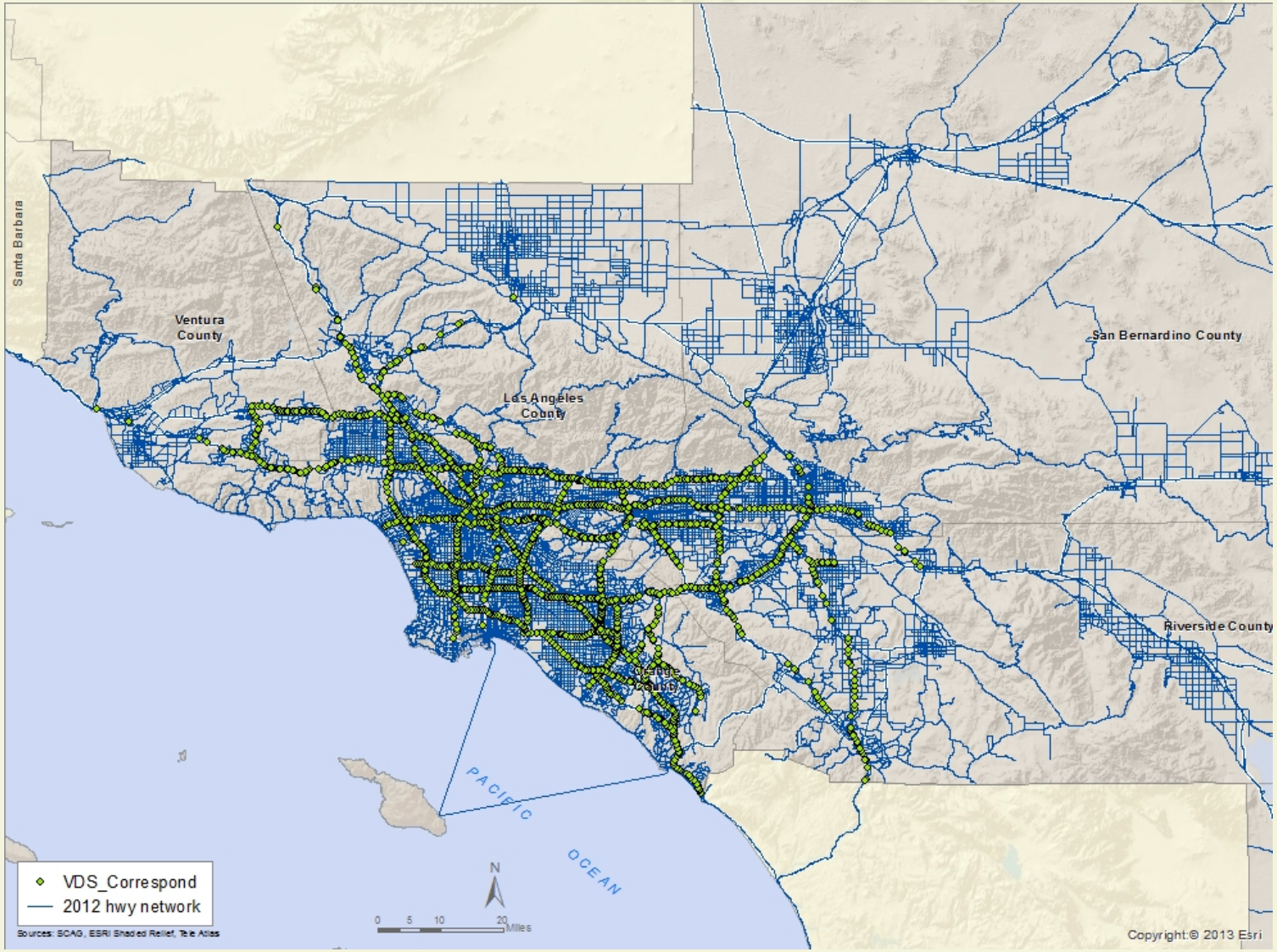
VDS Location Maps



PeMS Data & SCAG Network

- Use ArcGIS to execute ‘one to one’ spatial join, PeMS VDS locations with SCAG Highway Network links
- 2,992 out of 4,988 VDS (only ML and HOV) have reasonably corresponded SCAG Highway link (2,485 ML VDS Links and 507 HOV Links)

PeMS VDS on SCAG Network



Quality Control Procedure

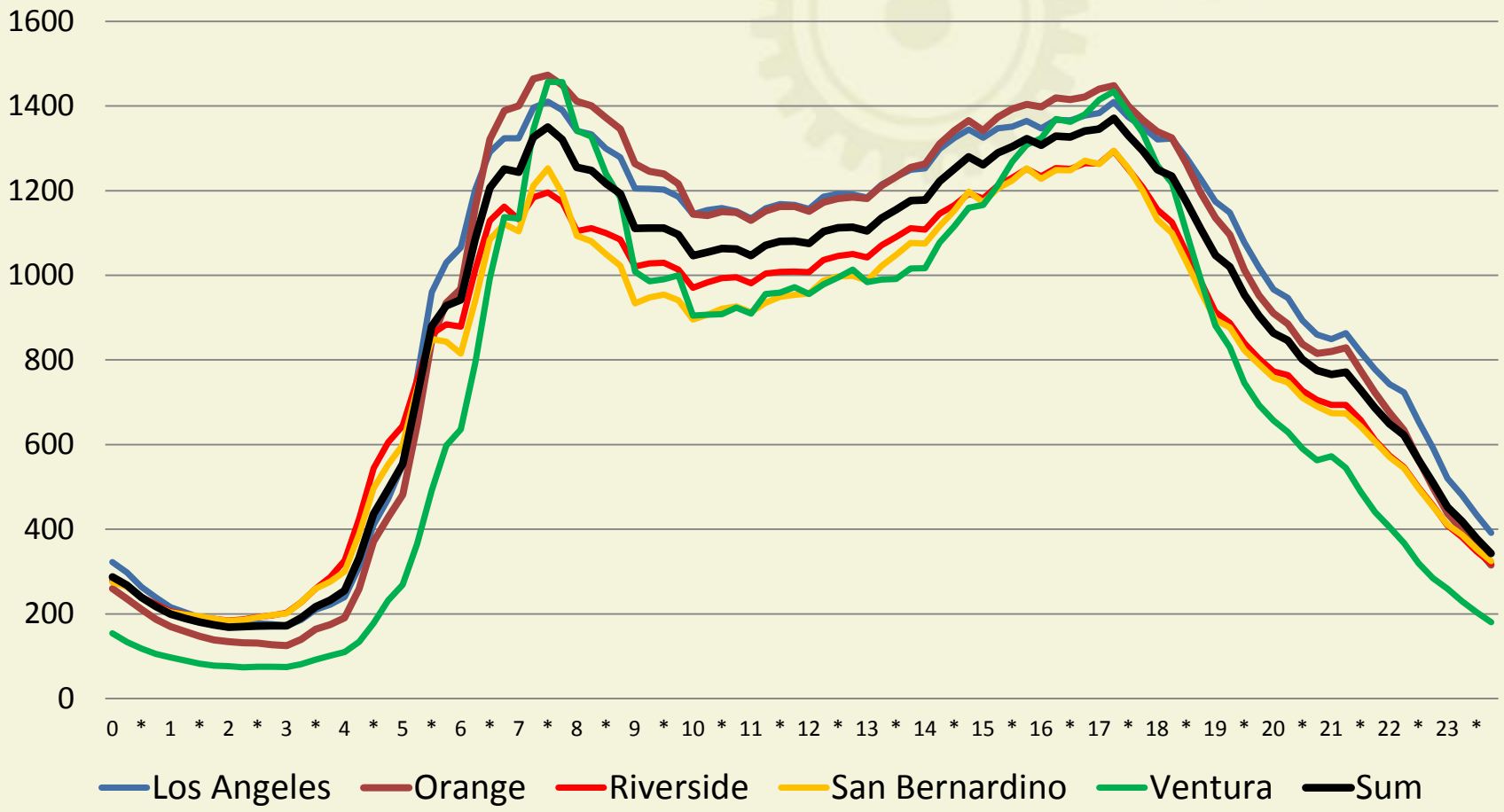
- Remove abnormal data (outliers)
  - Probably due to incidents or accidents
  - Weekday samples =156 (3 days/week, 52 weeks)
  - Test skewness and variance of data samples
  - Remove outliers (15% of total samples)
- Remove defective VDS
  - If daily v/c ratio < 0.15
  - Review final data for each freeway

Final Database Summary

- Includes traffic flow for each VDS
  - Remove outliers and defective VDS data
- 15-minute aggregated interval
- By mainline (mixed flow) and HOV lanes
- By weekday (Tuesday to Thursday) and weekend (Saturday and Sunday)
- Data is linked to SCAG's network (corresponds to highway network link ID)

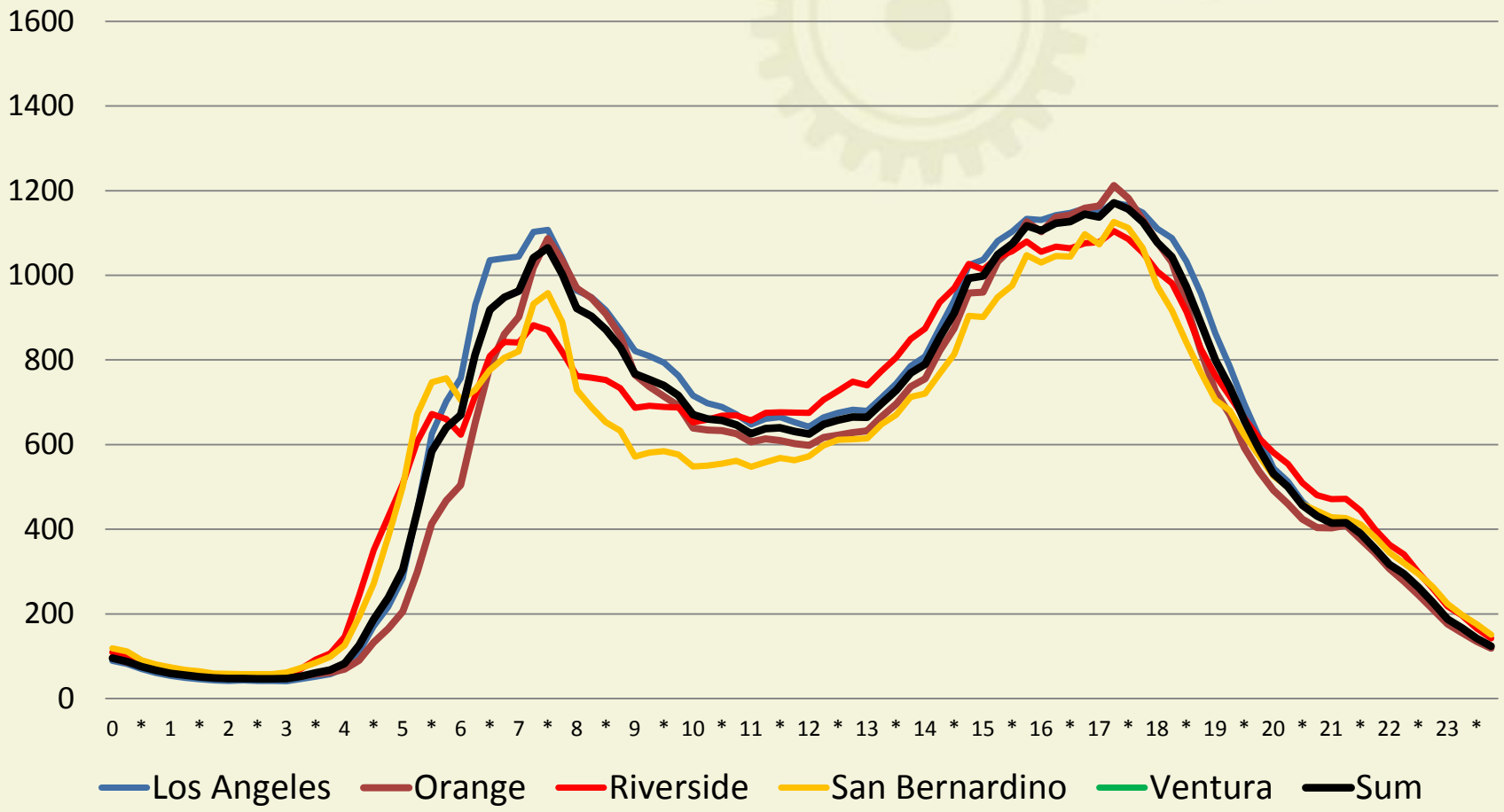
Data Analysis
(Hourly flow analysis)

Weekday Hourly ADT – Mainline (3 months)



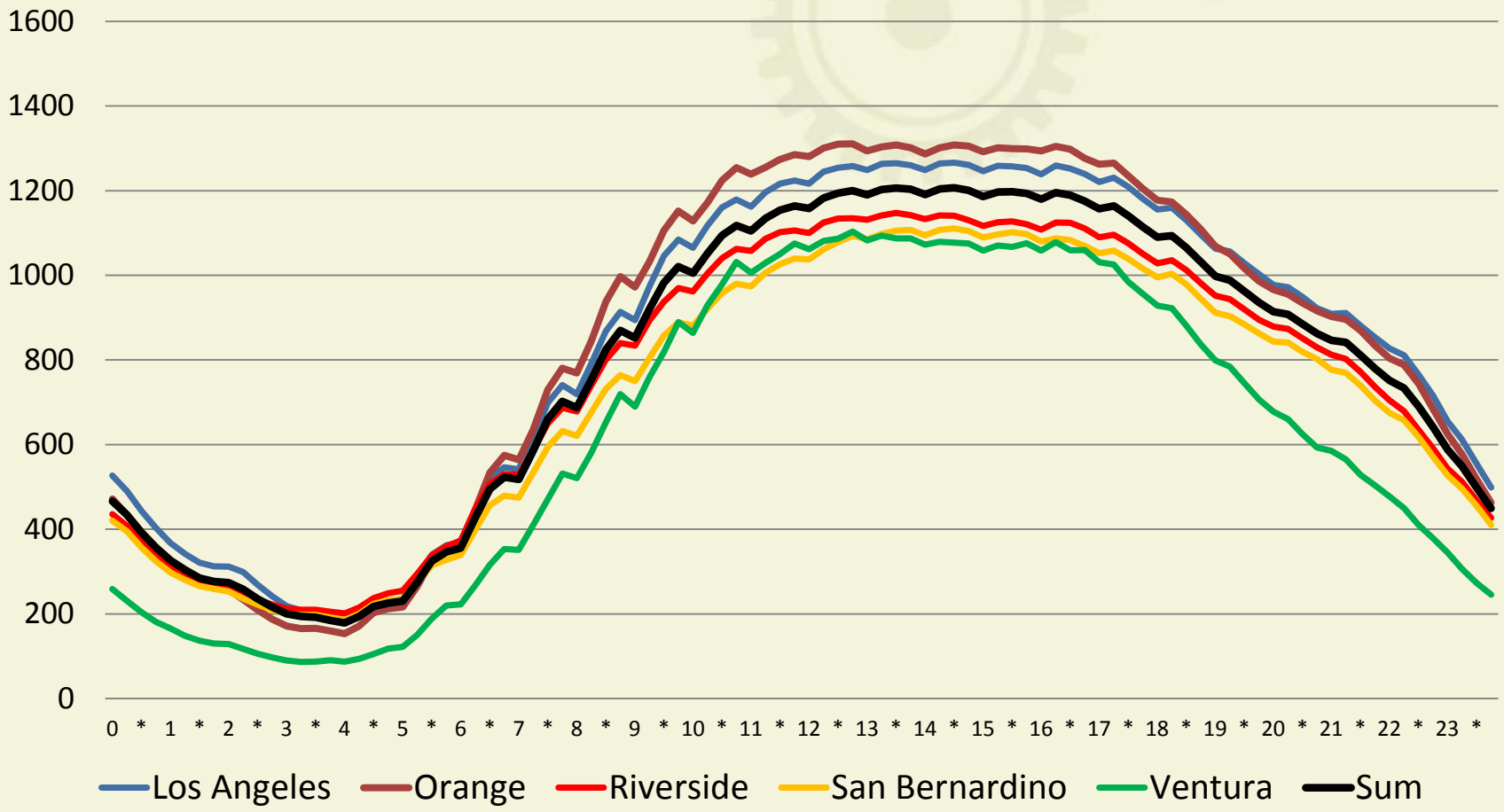
- *3 Months: March, April and May of 2012*

Weekday Hourly ADT – HOV (3 months)



- *3 Months: March, April and May of 2012*

Weekend Hourly ADT – Mainline (3 months)



- *3 Months: March, April and May of 2012*

Summary

Next Steps

- Will develop GIS based data framework
- Will calculate other time periods (monthly, yearly) and compare to model results
- Will check traffic flows near specific Cordon stations for screenline count analysis
- Will execute analysis on Caltrans Count Book data and HPMS count and VMT for model validation

Thank You!

Contact:
Sungsu Yoon (yoon@scag.ca.gov, 213.236.1991)
Lu Lu (lu@scag.ca.gov, 213.236.1824)

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